

REMARKS

In the Office Action, the Examiner rejected claims 1-19. By this paper, claims 1, 3, 9, 13, 15 and 19 have been amended, and claims 11, 12 and 18 have been canceled. Claims 20-35 were earlier withdrawn and claims 36-41 canceled. The amendments do not add any new matter. Upon entry of the amendments, claims 1-10, 13-17 and 19-35 will be pending, with claims 1-10, 13-17 and 19 currently being examined. Applicant requests reconsideration and allowance of all pending claims in light of following remarks.

Rejections Under 35 U.S.C. § 112

The Examiner rejected Claim 3 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter, especially in view of the term “enhanced”.

Applicant would refer the Examiner to page 10, lines 5-12 of the application. This paragraph describes the “enhanced hydrogen production mode”. As mentioned in this passage, “[i]n this mode, because a relatively low percent of fuel is utilized in the fuel cells as described above, a substantial quantity of hydrogen remains in the anode exhaust stream 20.” Applicant would also refer to page 9, lines 1–5 and lines 20-22, which describes *inter alia*, “in a low utilization mode wherein the hydrogen fuel is consumed between approximately 30% and approximately 70 % of the total fuel available for reaction” and “[i]n the low utilization mode, the mole fraction of H₂ at the outlet of the fuel cell may be in the range of about 0.1 to about 0.5” respectively. Fig. 7 shows typical fuel cell exit compositions of H₂ and CO as a function of the percent fuel utilization in the fuel cell. Hydrogen concentrations are shown by trace 90.

Claim 3 has been amended to reflect these facts more clearly. Claim 3 is now believed to be sufficiently clear, particularly in view of the amendment and the specification. Withdrawal of the rejection is requested.

Rejections Under 35 U.S.C. § 102

The Examiner rejected Claims 1, 3, 4, 6-9, 11, 12 and 15 under 35 U.S.C. §102 (b), as being anticipated by Farooque (U.S. Patent No. 5,084,362, hereinafter “Farooque”). The Examiner cited Baker et al. (U.S. Patent No. 3,522,101, hereinafter “Baker”) to evidence voltage range of a molten carbonate fuel cell in claim 4.

Farooque is missing features recited by independent claim 1.

Amended claim 1, recites inter alia, “the separation unit further comprising a moisture separator to separate water from the anode exhaust stream”. On page 6 of the Office Action, the Examiner clearly mentioned in point 12, that Farooque does not teach a system comprising a water condenser. For these reasons among others, discussed below Applicant requests removal of the foregoing rejections under 35 U.S.C. §102 (b).

Rejections Under 35 U.S.C. § 103

The dependent claims, as well as independent claim 1, were rejected in various manners based upon Farooque, or based upon a combination of Ukai et al. (U.S. Publication No. 2003/0035983, hereinafter “Ukai”) in view of Take (U.S. Publication No. 2004/0229092). Other dependent claims were rejected on other bases, including other secondary references.

Because claim 1 has been amended to incorporate subject matter originally recited in claims 11 and 12, and in claim 18, most relevant regarding the present state of claim 1 is the rejection based upon Farooque alone, in possible combination with Ukai and Take, or these in view of Nakamura et al. (U.S. Patent No. 7,052,790, hereinafter “Nakamura”).

In its amended form, claim 1 recites that the anode exhaust stream comprises carbon monoxide, carbon dioxide, unreacted fuel and water. Of course, at the temperatures present in the anode exhaust stream, the water is primarily in a vapor state. Claim 1 also now recites that the separation unit includes a moisture separator to separate

the water from the anode exhaust stream. Furthermore, the claim recites a recycle stream in which at least a portion of the anode exhaust stream is recycled back to the anode inlet after separation of hydrogen carbon monoxide, carbon dioxide and unreacted fuel and water. Thus, the water separated by the separation unit is not recirculated to the anode inlet, while unspent fuel is recirculated.

Regarding Farooque, or a possible combination of Farooque, Nakamura, and even possibly with Ukai and Take, Applicant notes first that Farooque specifically indicates that any fuel that is recirculated from the exhaust stream is *combined with*, and not separated from water. In particular, Farooque describes that:

[t]he turbo compressor 13, if employed, is driven by high pressure steam delivered to the compressor on line 17. The steam leaves the turbo compressor line 18 and is combined with the hydrogen from line 14 for delivery to the gasifier. Farooque, col. 3, lines 5-10.

Thus, the recirculation line in Farooque clearly contains unspent fuel *combined with water or water vapor* that is used to drive the turbo compressor. Thus, contrary to the recitations of claim 1, as amended, Farooque does not teach separation of water from the anode exhaust stream and recycling of water-separated fuel in that stream to the anode inlet.

The secondary references do nothing to obviate this deficiency in Farooque. Specifically, Nakamura teaches a fuel cell system with a fuel side condenser to cool exhaust gas and to condense water vapor. No exhaust, however, is recirculated in Nakamura. The mere fact that Nakamura removes water vapor or performs a condensation operation, is insufficient to suggest that any unspent fuel could or should be recirculated back to the anode inlet. At the very least, a combination of Farooque and Nakamura would nevertheless result in recirculation of wet hydrogen fuel back to the anode inlet, in order to remain consistent with the teachings of Farooque.

Regarding the possible combinations of these references with Ukai and Take (because these latter references were used to reject claims 11 and 12, *inter alia*), Applicant notes first that the Examiner recognized that Ukai fails to teach a fuel cell system comprising a separation unit in fluid communication with the assembly. The Examiner relied upon Take for teaching a hydrogen separator used to separate hydrogen from an anode exhaust gas. Applicant notes, however, that neither Ukai nor Take were used to reject original claim 18 that specifically recited the removal of water from the exhaust stream.

Nevertheless, a careful analysis has been made of Take, and while the reference does discuss various condensers at various locations in the multiple embodiments taught, *no condenser or separator is ever placed in the anode exhaust stream*, commonly referred to by reference numeral 19 or numeral 72 in the reference, *to remove water prior to recirculation of unspent fuel to the anode inlet*. The fact that Take does not foresee the use of a separation unit for this purpose, and the very fact that Farooque specifically teaches *combining* the unspent fuel with steam, indicates that the references either cannot establish a *prima facie* case of obviousness of claim 1 because the recitations are simply not taught, or that the references simply cannot be combined and still respect the teachings of the primary reference, Farooque.

Because no combination of the references cited by the Examiner would teach the invention now recited in claim 1, and particularly because any such combination would necessarily be antithetical to the teachings of the references themselves, a *prima facie* case of obviousness of claim 1, as amended, cannot be made out based upon the cited references. Claim 1 is therefore believed to be patentable in its present form, as are the claims depending therefrom. Reconsideration and allowance of all pending claims are requested.

Conclusion

Applicant respectfully submits that all pending claims should be in condition for allowance. However, if the Examiner believes certain amendments are necessary to clarify the present claims or if the Examiner wishes to resolve any other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: 8/13/2007

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